IN THE U.S. PATENT AND TRADEMARK OFFICE

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Applicant: Carl A CAROLI et al.

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Examiner: Shi K. Li

Title: WAVELENGTH-SELECTIVE ADD/DROP ARRANGEMENT FOR OPTICAL COMMUNICATION SYSTEMS

APPLICANTS' BRIEF ON APPEAL (2nd Corrected Version)

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APPLICANTS' BRIEF ON APPEAL

I. REAL PARTY IN INTEREST:

The real party in interest in this appeal is Lucent Technologies Inc. Assignment of the application was submitted to the U.S. Patent and Trademark Office and recorded at Reel 011989, Frame 0853.

II. RELATED APPEALS AND INTERFERENCES:

There are no known appeals or interferences that will affect, be directly affected by, or have a bearing on the Board's decision in this Appeal.

III. STATUS OF CLAIMS:

Claims 1, 2, 4-14 and 16-22 are pending in the application. Claims 1, 13, 19 and 21 are written in independent form.

Claims 1, 2, 4-14 and 16-22 have been finally rejected under 35 U.S.C. §103(a). Claims 3 and 15 have been canceled. Claims 1, 2, 4-14 and 16-22 are being appealed.

IV. STATUS OF AMENDMENTS:

An Amendment After Final ("AAF") was filed on May 22, 2006. In an Advisory Action dated May 31, 2006 ("Advisory") the Examiner stated that the amendments in the AAF would not be entered because the amendments to claims 19 and 21 changed "the scope of the claims" and "would require further consideration and/or search". In response, the Applicants'/Appellants' attorney spoke with the Examiner. Subsequently, Applicants/Appellants (hereafter "Appellants") filed a Supplemental AAF on August 18, 2006 which effectively withdraws the amendments to claims 19 and 21. The Examiner has verbally indicated he will enter this Supplemental AAF. The claims set forth in the

Claims Appendix have been formatted under the presumption that the Examiner will enter the Supplemental AAF.

V. SUMMARY OF CLAIMED SUBJECT MATTER:

(i) Overview of the Subject Matter of the Independent Claims

In general, the present invention is directed at methods for adding or dropping optical channels of a wavelength division multiplexed (WDM) signal. In more detail, an exemplary method includes a number of steps involving so-called "add", "drop" and "through" transmission paths, including the steps of: (a) dynamically equalizing the gain of optical channels in the through and add transmission paths on a per-channel basis (see Specification, page 11, lines 13-24); and/or (b) selectively blocking one or more optical channels so that only optical channels not being dropped at an add/drop node are passed on a through transmission path; and selectively blocking optical channels that have been previously added at the add/drop node and passed along in the through transmission path to avoid wavelength collisions. (see Specification, page 7, line 7 to page 8, line 31; page 10, line 4 to page 11, line 12).

Independent claim 1 reads as follows (specification references in parentheses are for example only):

1. A method for adding or dropping at least one optical channel of a wavelength division multiplexed (WDM) signal, the method comprising:

receiving a WDM input signal at an add/drop node (p. 6, ll. 3-5)

coupling the WDM input signal to both a drop transmission path and a through transmission path within the add/drop node (p. 6, ll. 3-5)

selectively dropping one or more optical channels from the WDM input signal in the drop transmission path (p.6, ll. 12-15)**;**

in the through transmission path, selectively blocking the one or more optical channels being dropped from the WDM input signal so that only optical channels not being dropped at the add/drop node are passed on the through transmission path (p. 6, l. 29 to p. 7, l. 2 and p. 7, ll. 7-32)**;**

in an add transmission path within the add/drop node,

selectively adding one or more optical channels by optically combining a plurality of optical channels into a WDM add signal, the plurality of optical channels in the WDM add signal having wavelengths corresponding to the wavelengths of the optical channels in the WDM input signal (p.8, ll. 14-17) **, wherein one or more of the plurality of optical channels are to be added at the add/drop node, and selectively blocking the optical channels that have been previously added at the add/drop node and passed along in the through transmission path to avoid wavelength collisions** (p.8, ll. 19-31)**;**

dynamically equalizing the gain of optical channels in the through and add transmission paths on a per-channel basis (p. 11, ll. 13-24)**; and**

combining the one or more optical channels from the add transmission path with the optical channels in the through transmission path to generate a WDM output signal for transmission from the add/drop node (p.8, l. 32 to p.9, l.3 and p.9, ll. 19-21)**.**

Independent claim 13 reads as follows (specification references in parentheses):

13. An add/drop node capable of adding or dropping at least one optical channel of a wavelength division multiplexed (WDM) signal, the add/drop node comprising:

an optical coupler for coupling a WDM input signal to both a drop transmission path and a through transmission path within the add/drop node (p. 6, ll. 3-5)**;**

an apparatus coupled to the drop transmission path for optically separating the WDM input signal into a plurality of optical channels, wherein one or more of the plurality of optical channels are selectively dropped from the WDM input signal (p.6, ll. 12-15)**;**

a first wavelength blocking element coupled to the through transmission path for selectively blocking the one or more optical channels being selectively dropped from the WDM input signal so that only optical channels not being dropped at the add/drop node are passed on the through transmission path, the first element comprising a first dynamic gain equalizer element for adjusting the gain of optical channels in the through transmission path on a per-channel basis (p. 6, l. 29 to p. 7, l. 2 and p. 7, ll. 7-32)**;**

in an add transmission path within the add/drop node,

an apparatus for combining a plurality of optical channels to form a WDM add signal, the plurality of optical channels in the WDM add signal having wavelengths corresponding to the wavelengths of the optical channels in the WDM input signal, wherein one or more of the plurality of optical channels in the WDM add signal are to be added at the add/drop node, and

a second wavelength blocking element for selectively blocking the optical channels that have been previously added at the add/drop node and passed along in the through transmission path to avoid wavelength collisions (p.8, ll. 14-17 and 19-31)**, the second element comprising a second dynamic gain equalizer element for adjusting the gain of optical channels in the add transmission path on a per-channel basis** (p. 11, ll. 13-24)**; and**

a combiner coupled to each of the add and through transmission paths for combining the one or more optical channels from the add transmission path with the optical channels in the through transmission path to generate a WDM output signal for transmission from the add/drop node (p.8, l. 32 to p.9, l.3 and p.9, ll. 19-21)**.**

Independent claim 19 reads as follows (specification references in parentheses):

19. A method for adding/dropping at least one optical channel of a wavelength division multiplexed (WDM) signal at an add/drop node, the add/drop node including a first transmission path for dropping selected optical channels from the WDM signal, a second transmission path for routing selected optical channels through the add/drop node, and a third transmission path for adding selected optical channels to the WDM signal, the WDM signal having a plurality of optical channels of different wavelengths, the method comprising:

receiving a WDM input signal at the add/drop node;

distributing the WDM input signal to the first and second transmission paths (p.12, ll. 4-17)**;**

dropping one or more optical channels from the WDM input signal in the first transmission path (p. 12, l. 26 to p. 13, l. 5)**;**

adding one or more optical channels to the WDM input signal in the third transmission path that will not cause wavelength collisions with any other previously added channel (p. 3, ll. 6-14)**;**

selectively routing optical channels in each of the second and third transmission paths to provide a reconfigurable add/drop capability by selectively blocking wavelengths in the second transmission path that correspond to optical channels being dropped from the WDM input signal

in the first transmission path, and selectively passing wavelengths in the third transmission path that correspond to optical channels being added at the add/drop node; and

combining the optical channels from the second and third transmission paths to generate a WDM output signal for transmission from the add/drop node (p. 15, ll. 15-26)**.**

Independent claim 21 reads as follows (specification references in parentheses are the same as claim 19 except as noted):

21. A method for adding/dropping at least one optical channel of a wavelength division multiplexed (WDM) signal at an add/drop node, the add/drop node including a first transmission path for dropping selected optical channels from the WDM signal, a second transmission path for routing selected optical channels through the add/drop node, and a third transmission path for adding selected optical channels to the WDM signal, the WDM signal having a plurality of optical channels of different wavelengths, the method comprising:

receiving a WDM input signal at the add/drop node;

distributing the WDM input signal to the first and second transmission paths;

dropping one or more optical channels from the WDM input signal in the first transmission path;

adding one or more optical channels to the WDM input signal in the third transmission path that will not cause wavelength collisions with any other previously added channel;

selectively routing optical channels in each of the second and third transmission paths to provide a reconfigurable add/drop capability by selectively blocking wavelengths in the second transmission path that correspond to optical channels being added to the WDM input signal in the third transmission path, and selectively passing wavelengths in the third transmission path that correspond to optical channels being added at the add/drop node; and

combining the optical channels from the second and third transmission paths to generate a WDM output signal for transmission from the add/drop node (p.16, l. 13 to p.17, l. 11) **.**

In order to make the overview set forth above concise, and thus useful to the members of the Board, the Appellants note that only some of the disclosure from the Specification that supports the independent claims has been included in the overview. Thus, the disclosure that has been included, or referred to,

above only represents a portion of the total disclosure set forth in the Specification that supports the independent claims.

(ii) The Remainder of the Specification Also Supports the Claims

The Appellants note that there is additional disclosure that also supports the independent and dependent claims. Further, by presenting the disclosure above the Appellants do not represent that this is the only evidence that supports the independent claims nor do Appellants necessarily represent that this disclosure can be used to fully interpret the claims of the present invention. Instead, this disclosure is an overview of the claimed subject matter.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL:

Appellants seek the Board's review and reversal of the Examiner's rejection of claims 1-3, 9, 12-15 and 19-22 under 35 U.S.C. §103(a) based on a combination of U.S. Patent No. 5,778,118 to Sridhar ("Sridhar") in view of U.S. Patent Application Pub. 2002/0067526 to Park et al ("Park") and claims 4-8, 10, 11 and 16-18 under 35 U.S.C. §103(a) based on a combination of Sridhar, Park and U.S. Patent No. 6,429,974 to Thomas et al ("Thomas").

VII. ARGUMENTS:

A.) THE SECTION 103 REJECTIONS

Claims 1-3, 9, 12-15 and 19-22 were rejected under 35 U.S.C. §103(a) based on a combination of Sridhar in view of Park. Further, claims 4-8, 10, 11 and 16-18 were rejected under 35 U.S.C. §103(a) based on a combination of Sridhar, Park and Thomas. Appellants respectfully disagree for at least the following reasons.

(i) Claims 1, 2, 9, 12-14 and 19-22 (claims 3 and 15 have been cancelled)

(a) The references do not disclose or suggest dynamic equalization.

Claims 1, 2, 9 and 12-14 include the feature of, among other things, dynamically equalizing the gain of optical channels in "through" and "add" transmission paths on a per-channel basis. Neither Sridhar nor Park discloses or suggests such equalization.

The only mention of equalization appears to be in Sridhar, column 4, lines 31-35, where it is stated that an optical signal may be split in various ratios. This is far from a disclosure of dynamic equalization on a per-channel basis. Further, any equalization occurs only in a through transmission path, not in both through transmission and add transmission paths as in the claims of the present invention.

(b.) The references teach away from "blocking" in both through and add transmission paths.

Each of the claims of the present invention also include the features of: (a) selectively blocking one or more optical channels so that only optical channels not being dropped at an add/drop node are passed on a through transmission path; and (b) selectively blocking optical channels that have been previously added at the add/drop node and passed along in the through transmission path to avoid wavelength collisions. In sum, the claims include selective blocking of optical channels in both through and add transmission paths.

Neither Sridhar nor Park, taken individually, discloses or suggests blocking in both through and add transmission paths. Sridhar, at best, discloses the blocking of optical channels in a through transmission path while Park at best discloses blocking in an add transmission path. Realizing that neither reference discloses both blocking functions the Examiner relies on their combination to reject claims 1, 2, 9, 12-14 and 19-22. Appellants respectfully

submit that this combination is improper because Sridhar teaches away from the selective blocking of optical channels that have been previously added at an add/drop node and passed along in a through transmission path to avoid wavelength collisions.

For example, in column 7, lines 7-18 Sridhar states: "Although the added optical channels are depicted as corresponding to the wavelengths blocked...this is not a requirement....." and "the optical signals which are added do not contact the optical filtering elements..." and yet further "..an arbitrary number of optical channels may be added...; the wavelengths ...do not need to correspond to the wavelengths of the channels blocked....". In sum, rather than suggest a relationship between the channels that are added in an add path and those that are passed along in a through path Sridhar goes out of its way to state that there is no relationship (see also, column 6, lines 38-43).

Thus, to combine Sridhar with Park would require Sridhar's principle of operation to be changed. This is impermissible. In sum, neither Sridhar nor Park, taken separately or in some permissible combination, discloses or suggests the dynamic equalization of claims 1, 2, 9 and 12-14 and the dual selective blocking of claims 1, 2, 9, 12-14, and 19-22.

(c) Further comments regarding claims 2 and 14.

Claims 2 and 14 include the feature of dynamically and automatically programming the selective blocking of one or more optical channels being dropped and added as a function of changing add/drop requirements. Neither Sridhar nor Park discloses or suggests such blocking of optical channels.

The Examiner states that the "tunable filters" in Park and Sridhar are akin to the programmed, selective blocking in the claims. Appellants respectfully disagree. The fact that a filter is tunable is not a disclosure, or a suggestion, that it is programmable.

In sum, neither Sridhar nor Park, taken separately or in combination, discloses or suggests the feature of dynamically and automatically

programming the selective blocking of one or more optical channels being dropped and added as a function of changing add/drop requirements as in claims 2 and 14.

(ii) Claims 4-8, 10, 11 and 16-18

Appellants respectively submit that claims 4-8, 10, 11 and 16-18 depend on independent claim 1 or 13 and, therefore, are patentable over the combination of Sridhar and Park in further view of Thomas for the reasons stated above with respect to claims 1 and 13 and because Thomas does not make up for the deficiencies of Sridhar or Park.

Conclusion:

For the reasons stated above, the Appellants respectfully request that the members of the Board reverse the Examiner's rejections and allow claims 1, 2, 4-14 and 16-22.

Respectfully submitted,

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VIII. CLAIMS APPENDIX

1. A method for adding or dropping at least one optical channel of a wavelength division multiplexed (WDM) signal, the method comprising:

receiving a WDM input signal at an add/drop node;

coupling the WDM input signal to both a drop transmission path and a through transmission path within the add/drop node;

selectively dropping one or more optical channels from the WDM input signal in the drop transmission path;

in the through transmission path, selectively blocking the one or more optical channels being dropped from the WDM input signal so that only optical channels not being dropped at the add/drop node are passed on the through transmission path;

in an add transmission path within the add/drop node, selectively adding one or more optical channels by

optically combining a plurality of optical channels into a WDM add signal, the plurality of optical channels in the WDM add signal having wavelengths corresponding to the wavelengths of the optical channels in the WDM input signal, wherein one or more of the plurality of optical channels are to be added at the add/drop node, and

selectively blocking the optical channels that have been previously added at the add/drop node and passed along in the through transmission path to avoid wavelength collisions;

dynamically equalizing the gain of optical channels in the through and add transmission paths on a per-channel basis; and

combining the one or more optical channels from the add transmission path with the optical channels in the through transmission path to generate a WDM output signal for transmission from the add/drop node.

2. the method according to claim 1, wherein the steps of selectively blocking the one or more optical channels being dropped and selectively blocking the optical channels not being added are dynamically and automatically programmed as a function of changing add/drop requirements.

3. (Cancelled)

4. The method according to claim 1, further comprising the step of separating the WDM input signal into at least a first and second group of optical channels according to a prescribed pattern so that channel spacing between the optical channels is thereby increased.

5. The method according to claim 4, wherein the step of separating comprises de-interleaving the WDM input signal so that optical channels in each of the first and second groups are spaced apart by at least one wavelength.

6. The method according to claim 4, wherein the step of separating comprises de-interleaving the WDM input signal so that adjacent optical channels in the WDM input signal are located in a different one of the first and second groups such that the first group includes optical channels having an odd channel number and wherein the second group includes optical channels having an even channel.

7. The method according to claim 4, further comprising the step of routing the optical channels in the first group along an express routing path within the add/drop node such that the optical channels in the first group cannot be dropped at the add/drop node.

8. The method according to claim 7, further comprising the step of interleaving the optical channels from the express routing path with the optical channels combined from the add and through paths.

9. The method according to claim 1, further comprising the step of optically demultiplexing the WDM input signal in the drop transmission path into a plurality of individual optical channels.

10. The method according to claim 9, further comprising the step of separating the WDM input signal in the drop transmission path into at least two groups of optical channels according to a prescribed pattern so that channel spacing between the optical channels is increased prior to optically demultiplexing the WDM input signal.

11. The method according to claim 10, wherein the step of separating comprises de-interleaving so that optical channels in each of the respective groups are spaced apart by one wavelength.

12. The method according to claim 1, wherein the WDM input signal comprises a plurality of optical channels of different wavelengths and wherein each optical channel in the WDM input signal is capable of being dropped and wherein each of the optical channels can be added to the output WDM signal.

13. An add/drop node capable of adding or dropping at least one optical channel of a wavelength division multiplexed (WDM) signal, the add/drop node comprising:

an optical coupler for coupling a WDM input signal to both a drop transmission path and a through transmission path within the add/drop node;

an apparatus coupled to the drop transmission path for optically separating the WDM input signal into a plurality of optical channels, wherein one or more of the plurality of optical channels are selectively dropped from the WDM input signal;

a first wavelength blocking element coupled to the through transmission path for selectively blocking the one or more optical channels being selectively dropped from the WDM input signal so that only optical channels not being

dropped at the add/drop node are passed on the through transmission path, the first element comprising a first dynamic gain equalizer element for adjusting the gain of optical channels in the through transmission path on a per-channel basis;

in an add transmission path within the add/drop node,

an apparatus for combining a plurality of optical channels to form a WDM add signal, the plurality of optical channels in the WDM add signal having wavelengths corresponding to the wavelengths of the optical channels in the WDM input signal, wherein one or more of the plurality of optical channels in the WDM add signal are to be added at the add/drop node, and

a second wavelength blocking element for selectively blocking the optical channels that have been previously added at the add/drop node and passed along in the through transmission path to avoid wavelength collisions, the second element comprising a second dynamic gain equalizer element for adjusting the gain of optical channels in the add transmission path on a per-channel basis; and

a combiner coupled to each of the add and through transmission paths for combining the one or more optical channels from the add transmission path with the optical channels in the through transmission path to generate a WDM output signal for transmission from the add/drop node.

14. The add/drop node according to claim 13, further comprising a controller coupled to and communication with the first and second wavelength blocking elements, the first and second wavelength blocking elements being dynamically and automatically programmable in response to the controller and as a function of changing add/drop requirements.

15. (Cancelled)

16. The add/drop node according to claim 13, further comprising a first optical interleaver for separating the WDM input signal into at least a first and second group of optical channels according to a prescribed pattern so that optical channels in each of the first and second groups are spaced apart by at least one wavelength within their respective groups.

17. The add/drop node according to claim 16, wherein the first group of optical channels are routed in an express routing path within the add/drop node such that the optical channels in the first group cannot be dropped at the add/drop node, the add/drop node further comprising a second optical interleaver for combining the optical channels from the express routing path with the optical channels combined from the add and through paths.

18. The add/drop node according to claim 13, wherein the apparatus for optically separating the WDM input signal comprises one or more optical demultiplexers and the apparatus for combining a plurality of optical channels in the add transmission path comprises one or more optical multiplexers.

19. A method for adding/dropping at least one optical channel of a wavelength division multiplexed (WDM) signal at an add/drop node, the add/drop node including a first transmission path for dropping selected optical channels from the WDM signal, a second transmission path for routing selected optical channels through the add/drop node, and a third transmission path for adding selected optical channels to the WDM signal, the WDM signal having a plurality of optical channels of different wavelengths, the method comprising:

receiving a WDM input signal at the add/drop node;

distributing the WDM input signal to the first and second transmission paths;

dropping one or more optical channels from the WDM input signal in the first transmission path;

adding one or more optical channels to the WDM input signal in the third transmission path that will not cause wavelength collisions with any other previously added channel;

selectively routing optical channels in each of the second and third transmission paths to provide a reconfigurable add/drop capability by

selectively blocking wavelengths in the second transmission path that correspond to optical channels being dropped from the WDM input signal in the first transmission path, and

selectively passing wavelengths in the third transmission path that correspond to optical channels being added at the add/drop node; and

combining the optical channels from the second and third transmission paths to generate a WDM output signal for transmission from the add/drop node.

20. The method according to claim 19, wherein the steps of selectively blocking and selectively passing are dynamically configurable as a function of changing add/drop requirements.

21. A method for adding/dropping at least one optical channel of a wavelength division multiplexed (WDM) signal at an add/drop node, the add/drop node including a first transmission path for dropping selected optical channels from the WDM signal, a second transmission path for routing selected optical channels through the add/drop node, and a third transmission path for adding selected optical channels to the WDM signal, the WDM signal having a plurality of optical channels of different wavelengths, the method comprising:

receiving a WDM input signal at the add/drop node;

distributing the WDM input signal to the first and second transmission paths;

dropping one or more optical channels from the WDM input signal in the first transmission path;

adding one or more optical channels to the WDM input signal in the third transmission path that will not cause wavelength collisions with any other previously added channel;

selectively routing optical channels in each of the second and third transmission paths to provide a reconfigurable add/drop capability by

selectively blocking wavelengths in the second transmission path that correspond to optical channels being added to the WDM input signal in the third transmission path, and

selectively passing wavelengths in the third transmission path that correspond to optical channels being added at the add/drop node; and

combining the optical channels from the second and third transmission paths to generate a WDM output signal for transmission from the add/drop node.

22. The method according to claim 21, wherein the steps of selectively blocking and selectively passing are dynamically configurable as a function of changing add/drop requirements.

IX. EVIDENCE APPENDIX

None.

X. RELATED PROCEEDINGS APPENDIX

None.